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EVIDENCE OF PERVASIVE METHANE SEEPAGE ALONG THE BASE OF ISRAEL'S MEDITERRANEAN SLOPE – PRELIMINARY RESULTS OF E/V NAUTILUS 2011 CRUISE

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Methane seepages are prominent throughout the Nile delta, but so far have not been observed north of Gaza. In the course of 2010 and 2011 *E/V Nautilus* collaborative cruises we collected high definition video and hand and short core samples utilizing state-of-the-art ROV operations at water depths of 500 to 1700 m of the Israeli Mediterranean. ROV dives at depths of 1100 to 1200 m on the western edge of Palmahim Disturbance, on seismically observed pockmarks and bright spot reflections, revealed active gas seepage sites. These are characterized by semi-periodic gas bubbling, carbonate chimneys, dark gas saturated sediment patches and a characteristic biogenic community. Sediments cores collected within the dark patches portray high concentrations of methane with Carbon isotopic values suggesting a biogenic origin, and oxygen depletion in near surface water. Seepage regions are also surrounded by wider areas of unusually intense seafloor burrowing. At a depth range of 600 to 800 m along the northern slope of the Palmahim Disturbance we mapped rocky reefs settled with rich fauna, particularly deep water corals. Preliminary analysis of a tubular sample revealed a chimney-like morphology and dolomite composition with $\delta^{13}\text{C}$ values as low as -40‰, suggesting it's formation was associated with methane oxidation. Yet, no evidence of active gas seepage was found in the vicinity of these reefs. Offshore Acco, northern Israel, we surveyed meters-scale pockmark features at a water depth of ~1100 m. Within one of these pockmarks we found a dark patch of sediments inhabited by tube worms, and sampled high concentration of methane. Farther west we documented an area of intense burrowing at the top of a seismically observed structural bulge. Seismic reflection data collected across the southern Levantine basin portray a prominent band of high amplitude and frequently reversed phase reflectivity, down to hundreds of msec below - and sub parallel to - the seafloor. Taken together our observations suggest that active or recent gas seepage extend along the entire base of the Mediterranean continental slope of Israel, and probably throughout much of the deep seafloor of the Levantine basin. Seafloor fluid flow and methane seepage probably play in this region a significant environmental role, which have not been sufficiently acknowledged to date.